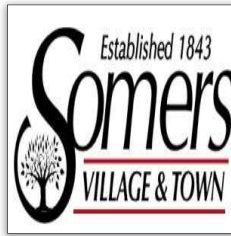


Village of Somers, Wisconsin

Water Conservation and Efficiency Plan



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EXECUTIVE SUMMARY

Water conservation is a key factor in the Village of Somers long-term water supply strategy. This Water Conservation and Efficiency Plan (Plan) establishes a path for efficiency in water use and meeting the environmental standards of the Great Lakes-St. Lawrence River Basin Water Resources Compact. This Plan follows the conservation targets outlined in NR 852, which are mandatory for new or increased diversions from the Great Lakes. The conservation measures laid out in this Plan include an overall goal of a 10% reduction in water use per residential equivalent (REU) and is focused on conservation activities for the next 5 years. The recommendations are consistent with the 20 year (2040) and ultimate buildout water saving goals.

The Village's water conservation goals include the following:

- Reduce the average day water use per resident equivalent unit (REU) by five percent from the 2018 value of 276 gallons per day per REU. The historical values are currently increasing.

The Village's objectives for achieving the above goal include the following:

- Comply with NR 852
- Align with the Southwestern Wisconsin Regional Planning Commission 2050 Regional Water Supply Plan
- Incorporate stakeholder and customer input in the evaluation
- Use the Alliance for Water Efficiency (AWE) Water Conservation Tracking Tool at least on an annual basis to estimate cost-effectiveness of conservation measures.

Long-term water conservation requires continuous evaluation of conservation measures combined with benefit-cost analysis. The Village has evaluated numerous conservation and efficiency measures (CEMs) using the Alliance for Water Efficiency (AWE) Conservation Tracking Tool. This tool is a water conservation calculator recommended by the Wisconsin Department of Natural Resources (WDNR). Using the tool resulted in a short list of potential CEMs for further evaluation. The AWE tool allows for a benefit-cost analysis was conducted to compare the costs and benefits of the implementation of each CEM. Benefits were estimated monetarily and in terms of volumes of water saved. CEMs that had neutral or positive benefit to cost ratios are marked as such in the report.

The recommended 5-year implementation plan includes the following elements: Expanded public education and information, additional customer water audits to design specific customer demand management strategies, and increasing program data gathering and monitoring to measure program effectiveness.

1. INTRODUCTION

1.1 Background

The Village of Somers (Village) was formed by the incorporation of part of the Town of Somers in 2015 and the annexation of part of the Town of Paris. The population in the Village is approximately 8,371 based on the U.S. Census Bureau's July 1st estimates with approximately 1,186 metered customers (or approximately 3,000 people). The majority of Village residents have private wells but are expected to connect to the public water system and become Utility customers in the upcoming years. Figure 1 below shows a map of the Village boundaries and the subcontinental divide (Divide).

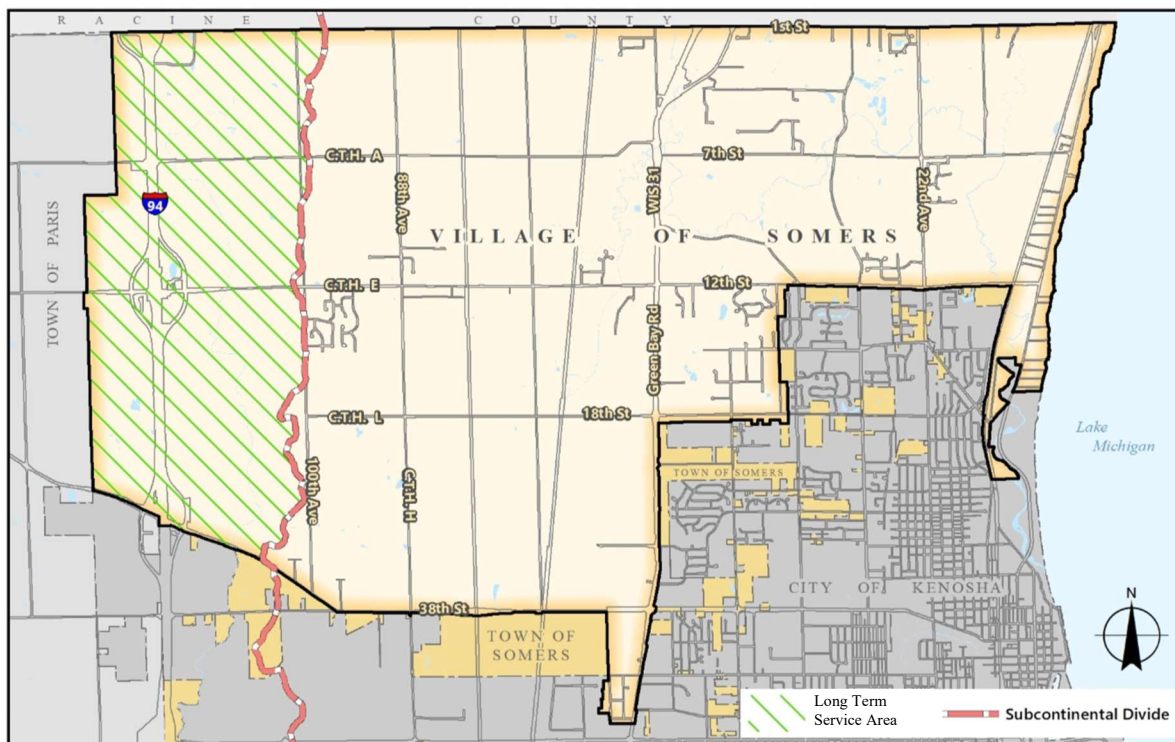


FIGURE 1: Map of Village Boundaries

Source: Kenosha County GIS and Village of Somers 2017 IGA

The Village owns and operates a municipal water and sewer system. KWU provides source water from Lake Michigan to the Village, who then returns all wastewater via the sanitary sewer system back to KWU for treatment and discharge to Lake Michigan. Currently, properties west of the Divide are unable to be served municipal water due to the Great Lakes-St. Lawrence River Basin Water Resources Compact. This plan is part of the Village's request for permission to provide service west of the Divide with source water from Lake Michigan via the Straddling Community Water Diversion Application.

1.2 Water System

The Village's existing system and meter locations are illustrated in Figure 2. Water mains exist primarily on the east side of the Village and as of 2018 the Village has 269,715 feet of water main, 1,186 meters, and 448 hydrants. Currently no water is being served to areas west of the Divide.

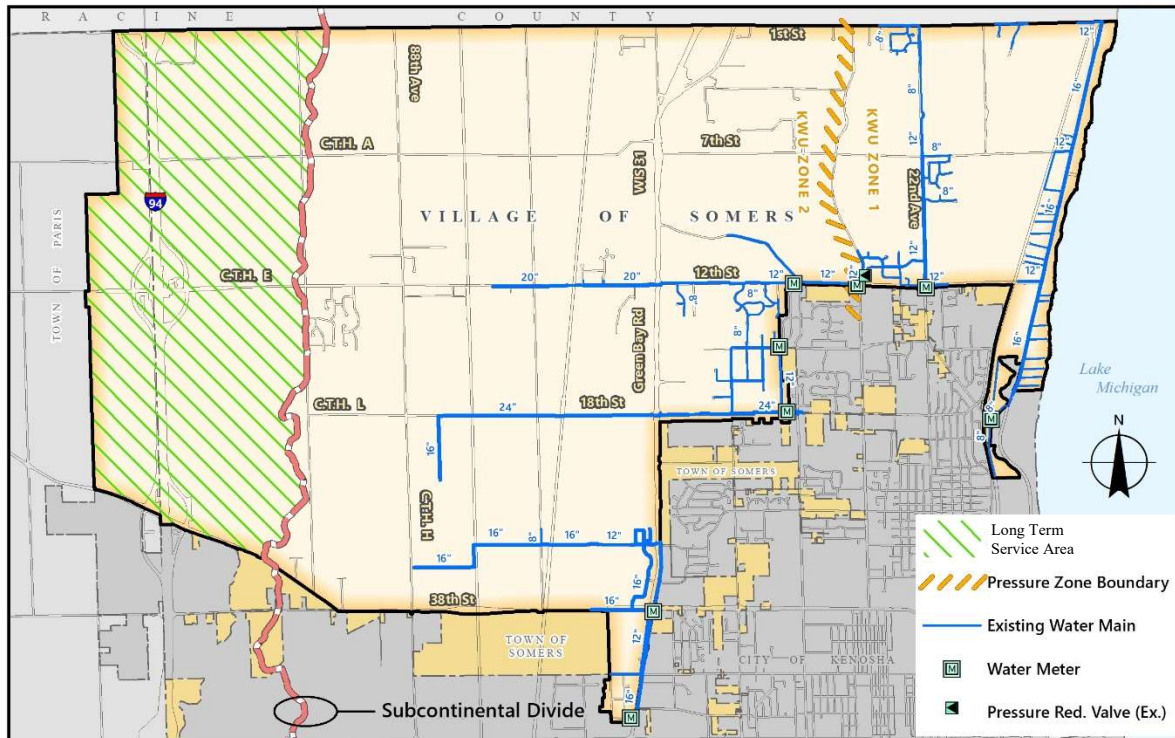


FIGURE 2: Existing Water Distribution Plan

Figure 3 shows the proposed ultimate water distribution plan. This Plan includes service to land within Village limits, areas east of the Divide not currently served, land west of the Divide with permission via the Diversion Application, and additional land within the Village growth area (currently Town of Paris). The Town of Paris land within the village growth area has been designated to be annexed to the Village in the future as part of the 2017 Intergovernmental Agreement (IGA).

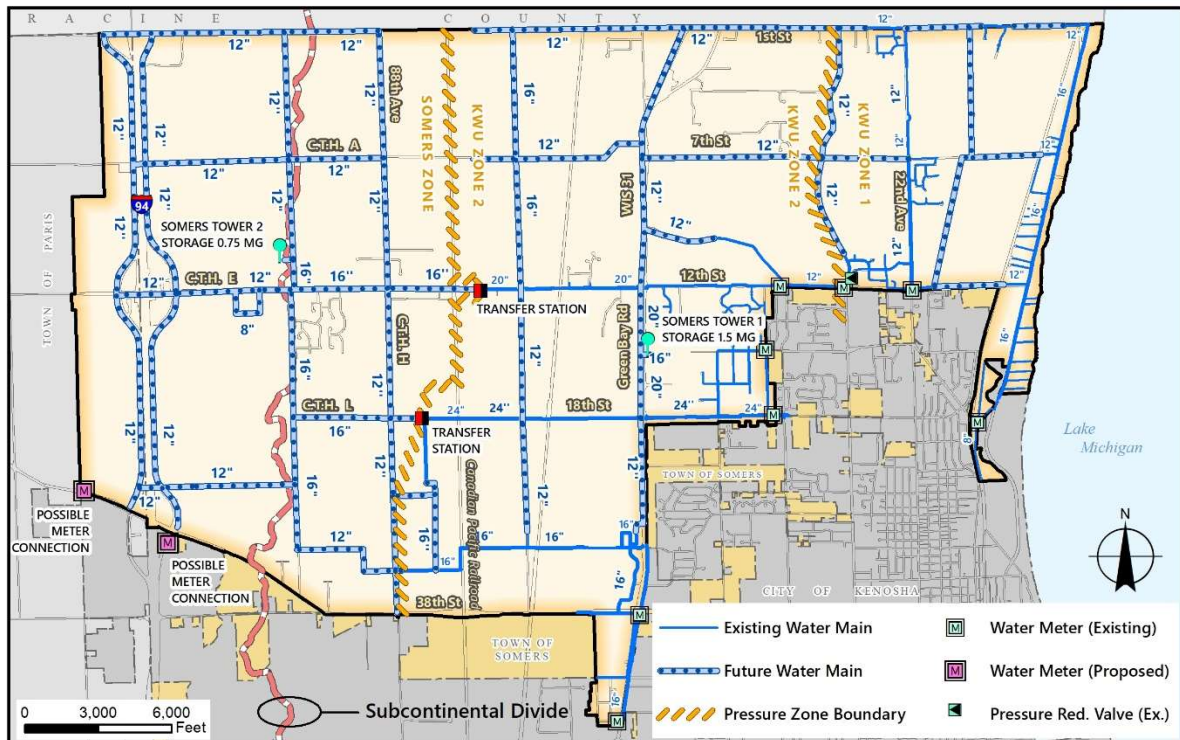


FIGURE 3: Proposed Ultimate Water Distribution Plan

Note: Local distribution mains are not shown.

2. WATER USE

2.1 Current Water Use

The Village's public water system is regulated by the Public Service Commission of Wisconsin (PSC). Figure 4 illustrates the breakdown by customer sector for the Village with the largest percentage being residential use. Table 1 summarizes the 2018 water audit conducted using PSC Chapter 185 guidelines.

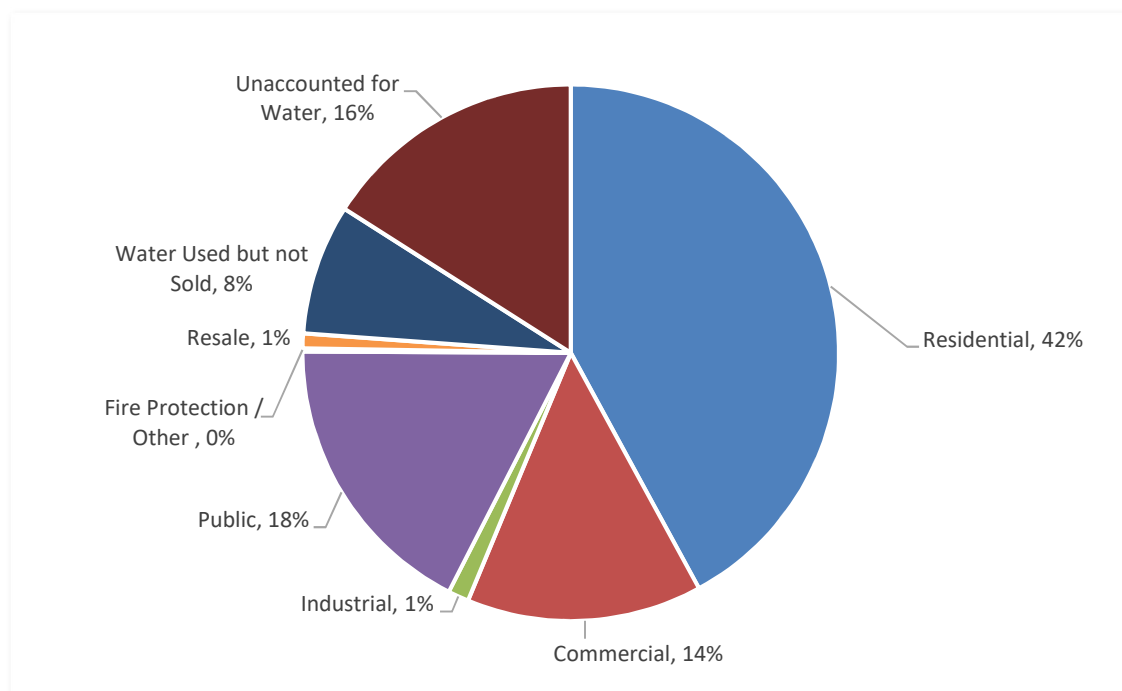


FIGURE 4: 2018 Water Use Summary

Source: 2018 Village of Somers Water Utility Annual PSC Report

TABLE 1
2018 Water Audit Summary

System Input Volume (Finished Water + Purchased Water) 188,400,000 gal	Authorized Consumption 158,293,000 gal	Billed Authorized Consumption 143,499,000 gal	Billed Metered Consumption (including water exported, wholesale sales) 143,499,000 gal	Revenue Water 143,499,000 gal
			Billed Unmetered Consumption (Bulk water sales, utility uses) 0 gal	
		Unbilled Authorized Consumption 14,794,000 gal	Unbilled Metered Consumption 6,873,000 gal	Non - Revenue Water 44,901,000 gal
			Unbilled Unmetered Consumption 7,921,000 gal	
	Water Losses 30,107,000 gal	Apparent Loss 459,000 gal	Unauthorized Consumption (Theft, uncontrolled hydrants, etc.) 459,000 gal	
			Metering Inaccuracies (Customer, station meters) 0 gal	
			Data Handling Errors 0 gal	
		Real Losses 29,648,000 gal	Leakage on Transmission and Distribution Mains 1,823,000 gal	
			Leakage and Overflows at Utility's Storage Tanks 0 gal	
			Leakage on Service Connections (Up to point of customer meter) 27,825,000 gal	

2.2 Water Use Trends

Figure 5 illustrates the water usage by month for 2014 through 2018; the water use is relatively consistent with no major changes except seasonal use. The Village uses more water in the summer and less in the winter, which is typical of a utility with no large industrial users.

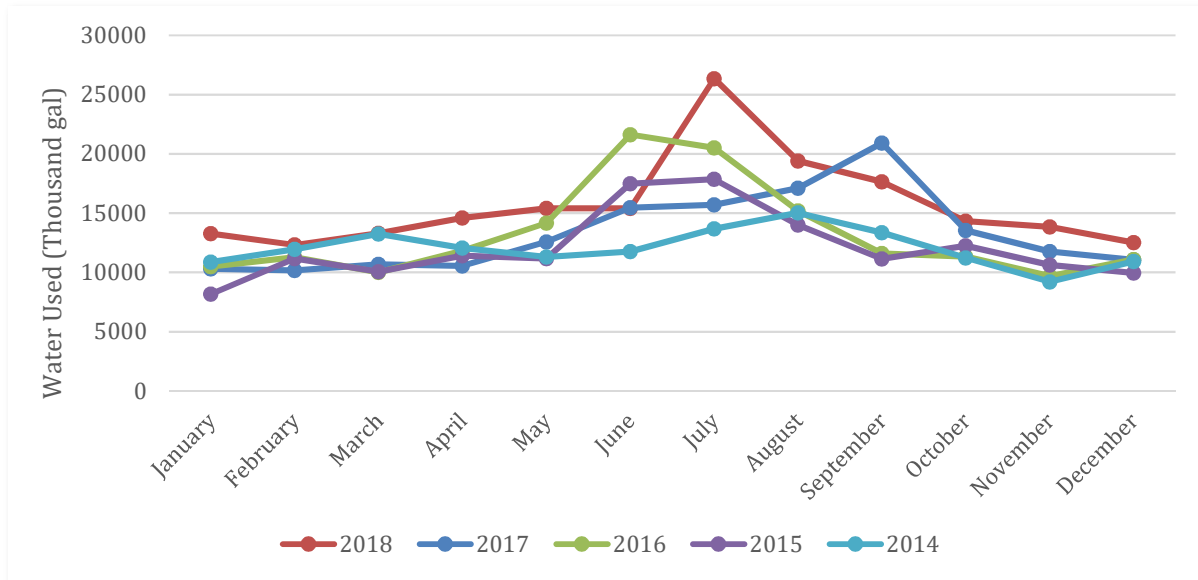


FIGURE 5: Seasonal Variation in Water Usage 2014-2018

Note: Based on metered water sales.

One means of tracking water use is by calculating the water use per Residential Equivalence Unit (REU). An example for this calculation is included in Appendix A. Based on the example calculation, the Village's 2018 average day water use was 276 gallons per day per REU. Average day water use per REU for the past 5 years is illustrated in Figure 6.

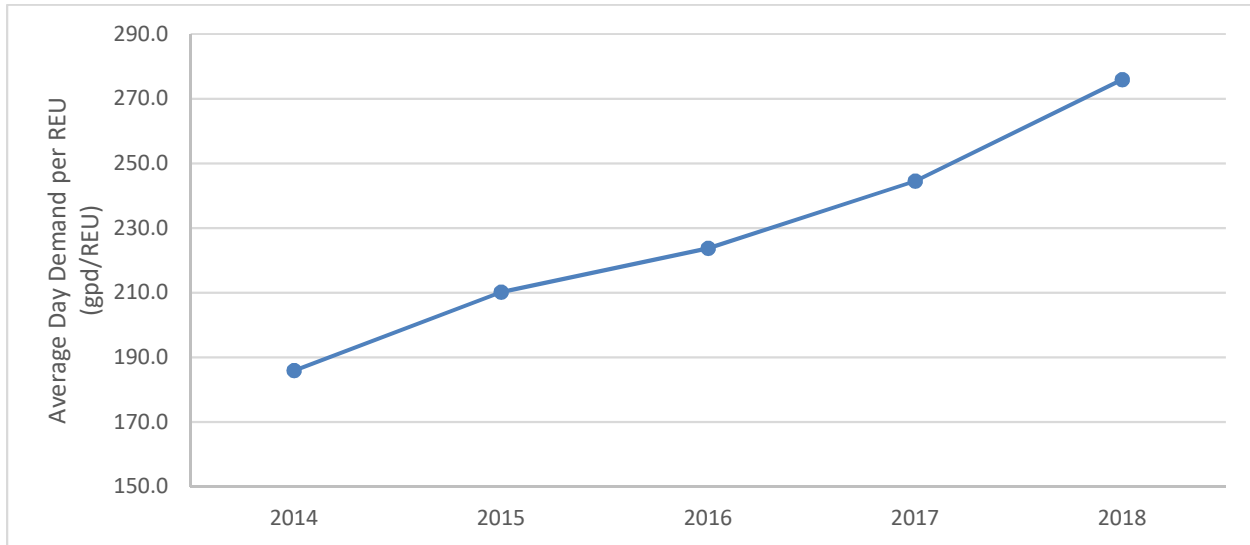


FIGURE 6: Average Day Water Use per REU 2014-2018

2.3 Projected Village Water Use

The projected population and water use of the Village is shown in Table 2. The projected average day water use at full build-out is projected to be 7.6 MGD. The associated maximum day water use is expected to be 12.9 MGD. For additional information on projected water use, see Chapter 5 of the Water Supply Service Area Plan.

TABLE 2
Projected Population and Water Demand

Year	Projected Village Population	Projected Percent of Population Served	Average Day Demand (MGD)
2010	8,191	33%	0.5
2020	11,179	55%	0.8
2030	24,058	86%	3.1
2040	36,937	95%	5.3
2050	49,816	100%	7.6

3. CONSERVATION AND EFFICIENCY MEASURES

3.1 Goals

The Village has set the following goals to improve water conservation and efficiency: educate consumers on the benefits of water conservation and reduce average day water use per REU by ten percent.

3.2 Conservation and Efficiency Measures

The conservation tiers from NR 852 and associated conservation measures are described below.

3.2.1 Water Use Audits

CEM #	Description	Required Elements in NR 852
PWS-1	Water Use Audit	Perform a water use audit and prepare written documentation of the audit results using the process outlined in one of the following: 1. Public water systems regulated by the Public Service Commission shall follow the water audit procedures indicated in ch. PSC 185. 2. Public water systems not regulated by the Public Service Commission shall submit water audit results with the water conservation plan required in s. NR 852.07.

The Village currently conducts an annual water audit in accordance with PSC 185. The Utility monitors its customer water sales during its regular quarterly billing cycle and compares these sales to wholesale water purchased from the Kenosha Water Utility. The Utility performs investigations when water loss approaches 15 percent of the volume purchased from KWU.

All customers are metered. Meters smaller than two inches are tested upon request of the customer but no less than once every 10 years. Meters larger than two inches are tested every two years. Ensuring all meters are correctly calibrated allows the Village to collect accurate data for water usage, identify leaks in the system, and minimize non-revenue water. The Utility may consider using the AWWA Water Audit software (version 5.0) to identify target areas for additional leak detection.

3.2.2 Leak Detection and Repair Program

CEM #	Description	Required Elements in NR 852
PWS-2	Leak Detection and Repair Program	Prepare a written program to control system losses in accordance with one of the following: 1. Public water systems regulated by the Public Service Commission shall follow the procedures indicated in ch. PSC 185 regarding system losses. 2. If a public water system is not regulated by the Public Service Commission has 1,000 or more service connections and system

CEM #	Description	Required Elements in NR 852
		losses greater than 15%, or has fewer than 1,000 service connections and system losses greater than 25%, the public water system shall complete a survey of leaks using one of the available technical methods and complete a corrective action plan.

The Village complies with system loss procedures in PSC 185. The Utility experiences approximately 5 water main breaks per year. Historically, unaccounted for water is approximately 12% of the purchased volume. In 2018 it was 16%; however, the majority of the breaks were in the Sheridan Road area. The Village intends to replace the water mains that are fed from Sheridan Road in 2020 and is in the planning phase to replace several miles of 1960's cast iron pipe along Sheridan Road. The Village has applied for a loan from the Safe Drinking Water Loan Program to assist in replacing these water mains. When these replacements are complete, all water mains served in the KWU Zone 1 will be less than 15 years old and the volume of unaccounted for water should decrease.

3.2.3 Information and Education Outreach

CEM #	Description	Required Elements in NR 852
PWS-3	Information and Education Outreach	<ol style="list-style-type: none"> 1. Provide information to employees and customers regarding water conservation and water use efficiency. Include all of the following items: reasons water conservation is necessary, consequences of not conserving water, and actions needed to achieve the water conservation goals of the community. Provide information and education in an effective format to customers and employees specific to landscape watering practices. Public water systems regulated by the Public Service Commission shall follow the Utility billing procedures indicated in ch. PSC 185. 2. Develop and deliver a training plan to educate and train employees on the implementation of water conservation and efficiency measures at public water system facilities. Information and education materials shall be made available to the department.

The Village's water conservation goals and AWE tool results will be shared with the residents on the Village website. This website will include resources for residents, educators, and contractors to learn more about water conservation, high efficiency plumbing fixtures, unaccounted for water, and the water system in general.

In addition, the Village can partner with its largest water user, UW-Parkside, to educate college students and staff on water conservation and reuse techniques.

3.2.4 Performing Source Management

CEM #	Description	Required Elements in NR 852
PWS-4	Source Management	Measure or estimate all water withdrawals monthly or more frequently to allow for identifying and understanding variability in water use over time. Public water systems regulated by the Public Service Commission shall follow the metering requirements provided in ch. PSC 185.

KWU bills the Village for source water and wastewater. The Village bills their residents on a quarterly basis. This data will be plotted to determine the difference and identify potential issues. In addition, KWU regularly tests and recalibrates the Somers master supply meters on an annual basis. Additional steps may include comparing water sales and wastewater pumped from individual drainage basins.

3.2.5 Distribution System Pressure Management

CEM #	Description	Required Elements in NR 852
PWS-R1	Distribution System Pressure Management	Analyze distribution system pressure management to identify opportunities to reduce water use and minimize plumbing fixture leaks.

The Village's distribution system is operated to meet the standards of NR 811.70. The Village does not have pumping facilities at this time. Water pressure will be monitored on the suction lines of future pumping stations and at future metering locations and transferred to the Utility's SCADA system.

3.2.6 Residential Demand Management Program

CEM #	Description	Required Elements in NR 852
PWS-R2	Residential Demand Management Program	Establish and publicize a program to complete residential customer water use audits and leak surveys upon customer request based on high or aberrant water use. In developing the program, a waiver of liability and written permission from the customer may be needed.

A future meter reading system will detect abnormal usage at each metering site so that the customer can be made aware of problems, such as a running toilet, before receiving their monthly bill. The Village will also implement voluntary lawn sprinkling restrictions.

University of Wisconsin – Parkside, the Utility's largest customer, recently upgraded to more efficient fixtures and controls water volumes to water lawns and sports fields.

3.2.7 Commercial and Industrial Demand Management Program

CEM #	Description	Required Elements in NR 852
PWS-R3	Commercial and Industrial Demand Management Program	Establish and publicize a program to complete commercial and industrial customer water use audits and leak surveys upon customer request based on high or aberrant water use. In developing the program, a waiver of liability and written permission from the customer may be needed.

The Village currently has few industrial customers, but is projecting a large increase as final build-out is reached. In the meantime, conservation measures can be directed towards commercial and industrial customers similar to the residential program. Information on water conservation best practices will be provided to all commercial and industrial customers. Recommended best practices include automatic sprinkler systems and high-efficiency toilets. Rebates for implementing best practices may be considered by the Village.

3.2.8 Water Reuse

CEM #	Description	Required Elements in NR 852
PWS-R4	Water Reuse	Conduct a technical assessment to evaluate the feasibility of water reuse in the operation of the facility. Implement water reuse projects identified by the assessment and allowed under current state law.

The Village water customers are directed to Kenosha Water Utility's webpage for water reuse methods. The Village will continue to look for opportunities to encourage water reuse, such as rain barrels and rain gardens for residential customers and larger opportunities with UW-Parkside and other large institutional users.

3.3 AWE Tool Results

The Alliance for Water Efficiency maintains the Water Conservation Tracking Tool to assist in the evaluation of water savings, costs, and benefits of conservation programs. This tool provided the Village with a standard for comparison of water savings and benefit-cost (B/C) ratios. The expected cost of implementation, water savings, and start year of each CEM are shown in Table 3. The results of the tool are shown in Table 4. B/C ratios greater than one indicates greater benefit than cost, and a B/C lower than one indicates greater cost than benefit. Net Present Value (NPV) indicates the estimated present savings (positive value) or cost (negative value) of implementing each CEM. All CEMs studied in this report have positive B/C ratios. The basis for evaluating the cost savings for each CEM is the wholesale cost of water purchased from the KWU, which is estimated at \$2,155 initially and assumed a nominal 2% annual increase over the life of the project.

TABLE 3
AWE Conservation Tracking Tool Input Information

CEM #	Description	User Class	Start Year	Yearly Cost	Water Savings (MGY)
PWS-1	Water Use Audit	Utility-wide	2020	\$5,000	1.31
PWS-2	Leak Detection and Repair Program	Utility-wide	2020	\$10,000	3.27
PWS-3	Information and Education Outreach	Institutional	2022	\$1,000	0.34
PWS-3	Information and Education Outreach	Multi-Family	2022	\$3,000	1.33
PWS-3	Information and Education Outreach	Single-Family	2022	\$1,000	0.3
PWS-4	Source Management	Utility-wide	2022	\$5,000	0.65
PWS-R1	Distribution System Pressure Management	Utility-wide	2022	\$5,000	0.65
PWS-R2	Residential Demand Management	Multi-Family	2022	\$8,000	10.64
PWS-R2	Residential Demand Management	Single-Family	2022	\$2,000	2.36
PWS-R3	Commercial Demand Management	Commercial	2022	\$5,000	0.32
PWS-R3	Industrial Demand Management	Industrial	2022	\$5,000	0.32
PWS-R4	Water Reuse	Utility-wide	2022	\$5,000	0.65

TABLE 4
AWE Conservation Tracking Tool Output Information

CEM #	Description	User Class	NPV (\$)	B/C Ratio	Lifetime Water Savings (MG)
PWS-1	Water Use Audit	Utility-wide	\$22,648	1.3	49
PWS-2	Leak Detection and Repair Program	Utility-wide	\$97,654	1.6	121
PWS-3	Information and Education Outreach	Institutional	\$10,486	1.6	12
PWS-3	Information and Education Outreach	Multi-Family	\$41,865	1.9	42
PWS-3	Information and Education Outreach	Single-Family	\$3,794	1.2	9
PWS-4	Source Management	Utility-wide	(\$29,710)	0.6	24
PWS-R1	Distribution System Pressure Management	Utility-wide	(\$29,710)	0.6	24
PWS-R2	Residential Demand Management	Multi-Family	\$635,326	5.8	356
PWS-R2	Residential Demand Management	Single-Family	\$137,216	5.2	79
PWS-R3	Commercial Demand Management	Commercial	(\$60,421)	0.3	10
PWS-R3	Industrial Demand Management	Industrial	(\$59,873)	0.3	10
PWS-R4	Water Reuse	Utility-wide	(\$34,945)	0.6	22
Total Conservation Activities			\$734,330	1.8	760

It is intuitive to implement the CEMs with the highest B/C ratio first, however, changes in technology may allow easier implementation of measures with lower B/C ratios. PWS-R2 should be implemented first and PWS-3 should be implemented later due to their comparatively lower benefit.

The net reduction to the Village's 2018 water use per REU was calculated using only the cost effective measures from Table 4. This includes PWS-1, PWS-2, PWS-3, and PWS-R2 and totals approximately 19.6 MGY of water conserved. The reduction to the Village's 2018 water use per residential equivalence unit of 276 gpd per REU (Chapter 2) is expected to be 10 percent based on the calculations below.

Percent Reduction to 2018 Water User per REU

2018 Volume Purchased	188.4	MGY
2018 Total REU's	1870.3	REU
2018 Water Use per REU	276	<u>gpd/REU</u>
Less Volume Conserved	168.9	MGY
Water Use per REU	247	<u>gpd/REU</u>
<u>Percent Reduction</u>	<u>10%</u>	

3.4 Benchmarking Progress

Data collection will continue at all customer meters and water service meters from KWU. The water conservation plan should be reviewed annually against the required PSC reporting. A formal update of the plan should accompany an authority to construct or rate increase greater than five percent.

APPENDIX

Sample Calculation

Calculate Residential Equivalent Units

$$\text{Number of Meters} * \text{REU Ratio} = \text{REU}$$

$$686 \text{ meters} * 1 = 686 \text{ REU}$$

Meter Size	Number of Meters*	REU Ratio**	REU
5/8	686	1	686
3/4	241	1	241
1	158	1.67	263.9
1 1/2	49	3.33	163.2
2	36	5.78	208.1
3	11	13.3	146.3
4	3	22.3	66.9
6	2	47.3	94.6
10	0	122	0
Total	1186		1870

Calculate Average Day Water Use per REU

$$\text{Water Use}/\text{REU} = \frac{\text{Average Day Water Use}}{\text{Total REU}}$$

$$\text{Average Day Water Use} = \frac{\text{Total Water Purchased}}{365 \text{ days}}$$

$$\text{Total Water Purchased} = 188,400,000 \text{ gallons}^*$$

$$\frac{188,400,000 \text{ gal}}{365 \text{ days}} = 516,164 \text{ gpd}$$

$$\frac{516,164 \text{ gpd}}{1870 \text{ REU}} = 276.0 \text{ gpd}/\text{REU}$$

* From Village of Somers Water Utility Annual Report 2018

** American Waterworks Association